List of Prosobranch Gastropod Molluscs of the Moneron Island Shelf (Sea of Japan) with Reference to their Distribution and Biogeographical Composition

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With Text-figure 1 and Table 1

Introduction

Although gastropod molluscs of the north-western Pacific have been studied for many years, compositions of the fauna of gastropod molluscs of the far-eastern seas remain poorly studied. The northern Pacific is not an exception in this respect, and only a few publications concern species composition and ecology of the molluscan fauna (Bartsh, 1929; Zaks, 1933; Galkin and Scarlato, 1955; Golikov and Scarlato, 1967, 1985; Golikov and Sirenko, 1980; Gulbin, 1980; Gulbin & Shulmina, 1981; Gulbin et al., 1985). The fauna of gastropods of the northern coast of Japan is studied much better and described by Japanese researchers in a number of publications.

The fauna of the Moneron Island shelf is of particular biogeographical interest connected with specific position of the island, sheltered from the direct effect of cold Okhotsk waters by Krilion peninsula and subjected to an effect of water circulation of the warm Tsushima current, contacting with cold somewhat diluted waters entering from the northern part of the Tatar Strait. An intensive dynamics of waters near Moneron Island results in the prevalence in sediments of coarse-grain material, gravel and shingle. Rock exposures are common not only in coastal zones but also at depths down to 115 m. The Tsushima current can bring to the island shores planktonic larvae of subtropical species from adjacent areas of Hokkaido and northern Honshu. Unique settlements of gastropod mollusc *Haliotis* (*Nordotis*) *discus* in the upper shelf of Moneron Island is an example of such penetration. Probably, when

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the Tsushima current is more intensive, transport of larvae of warm-water species to Moneron Island becomes common.

Material

The study used the collections of hydrobiological expeditions of the Institute of Marine Biology in 1972 and 1976–1977. The fauna was sampled from the intertidal zone down to a depth of 300 m. Forty-nine samples of macrobenthos were taken in the intertidal zone, 347 samples were taken by divers in the upper shelf down to 40 m, and 180 samples were obtained with the use of bottom dredges, dredges and trawls in the outer shelf down to a depth of 300 m. Moreover, collections of the Kurile-Sakhalin expedition of the Zoological Institute (about 40 trawl samples in total) taken in 1947–1949 in the area of Moneron Island were studied.

The List of Prosobranch Gastropod Molluscs

One hundred and thirteen species of gastropod prosobranch molluscs belonging to 64 genera, 33 families and 13 orders were found on the Moneron Island shelf.

The column 'Biogeographical group' includes abbreviations of the names of different types of areas of molluscan distribution:

1. str-lb: Asian subtropical-low boreal species, spread in the Yellow and Japan seas, around Japan and spreading into the warmest low-boreal area.
2. lb: Asian low-boreal species, spread mainly around the northern Japan, in the northern Sea of Japan and in the southern Sea of Okhotsk (down to Terpeniya Mys cape and Iturup Island).
3. hb: Pacific high-boreal species occurring mostly in the Sea of Okhotsk (the southern part exclusive) and in the Pacific from the middle and northern Kurile Islands to the American coasts.
4. wb: Pacific widespread boreal species occurring in the boreal waters at Asian and American coasts.
5. b-a: boreal-arctic species.

The column 'Substrate' includes the following abbreviated names:

1. r: rocks
2. st: stones
3. shi: shingle
4. she: shell
5. sa: sand
6. si: silted sand

The column 'Depth' gives depth of sampling on the Moneron Island shelf in m; 'int' denotes intertidal zone.

Star (*) marks the species represented by empty shells only, alive molluscs did not occur in our collections.

Substratum Preferences of Gastropod Molluscs

While hard grounds predominate on the Moneron Island shelf, a majority of shelf population were found on hard substratum. Only on rocks, boulders and stones we found near Moneron Island 41 species: *Collisella dorsuosa, C. patina, C. radiata, Testudinalia scutum, Problacmaea moskalevi, P. sybaritica, Tugali gigas, Puncturella cucullata*

A list of prosobranch gastropods of the Moneron Island shelf

	Species	Biogeographical group	Depth (m)	Substratum
	Ordo Docoglossa Familia Tecturidae			
1	*Collisella cassis* (Eschscholtz)	wb	intertidal	r, st
2	*C. dorsuosa* (Gould)	str-lb	int-4	r, st
3	*C. patina* (Eschscholtz)	wb	int-23	r, st
4	*C. radiata* (Eschscholtz)	wb	int-5	r, st
5	*Testudinalia scutum* (Eschscholtz)	wb	int-3	r
6	*Acmaea pallida* (Gould)	lb	int–100	r, st, sa-she
7	*Problacmaea moskalevi* (Golikov et Kussakin)	wb	17–25	r
8	*P. sybaritica* (Dall)	wb	int–150	r, st
9	*Cryptobranchia kuragiensis* (Yokoyama)	lb	1–70	r, st, shi, sa-she
	Ordo Dicranobranchia Familia Emarginulidae			
10	*Tugali gigas* (Martens)	lb	1–75	r, st
	Familia Fissurellidae			
11	*Puncturella cucullata kawamurai* Habe	lb	20–50	r, st
12	*P. fastigiata* Adams	str-lb	40–80	r, shi-she
13	*P. nobilis* (Adams)	lb	int–40	r, st, shi-she
14	*P. raricostata* Golikov et Sirenko	lb	65–70	st
	Ordo Fissobranchia Familia Scissurellidae			
15	*Scisurella crispata* Fleming*	b-a	30–70	shi-she
16	*S. disciformis* Golikov et Sirenko	lb	50–70	shi-she
17	*S. obtusata* Golikov et Gulbin*	wb	20–70	st, shi, she
	Familia Haliotidae			
18	*Haliotis discus* Reeve	str-lb	1–10	r
	Ordo Anisobranchia Familia Trochidae			
19	*Margarites helicina* (Phipps)	b-a	1–10	r
20	*M. pilsbryi* Kuroda et Habe	lb	1–60	r, st, shi-she
21	*M. vahlii* (Moeller)	b-a	30–70	r, st
22	*Solariella delicata* Dall*	lb	170	si
23	*S. obscura* (Couthouy)	b-a	170	r
24	*Tristichotrochus consor* (Lischke)	str-lb	15–75	r
	Familia Umboniidae			
25	*Minolia iridescens* (Schrenck)	lb	int–60	r, st, sa-shi-she
26	*M. minima* Golikov in Golikov et Scarlato	lb	9	r
27	*M. picturata* (Golikov in Golikov et Scarlato)	lb	1–18	r, st, sa
	Familia Turbinidae			
28	*Homalopoma amussitata* (Gould)	lb	int–70	r, st, sa-shi-she
29	*H. maculata* Golikov et Gulbin	wb	7–70	r, st, shi-she
30	*H. sangarense* (Schrenck)	lb	int–45	r, st, sa-shi-she
	Ordo Protopoda Familia Turritellidae			

(continued)

	Species	Biogeographical group	Depth (m)	Substratum
31	*Turritella fortilirata* Sowerby*	lb	100–115	st-sa-she
	Ordo Discopoda			
	Familia Lacunidae			
32	*Lacuna reflexa* Dall	wb	3	r
33	*L. uchidai* (Habe)	lb	int–25	r
34	*Epheria decorata* (Adams)	lb	int–25	r, shi
35	*E. turrita* (Adams)	lb	int–25	r, st
	Familia Littorinidae			
36	*Littorina brevicula* (Philippi)	str-lb	int–1	r
37	*L. sitkana* Dall (=*L. kurial* Middendorff)	wb	int–25	s, st
38	*L. sualida* Broderip et Sowerby*	wb	100	she
	Familia Falsicingulidae			
39	*Falsicingula athera* Bartsxh in Golikov et Scarlato	lb	int–10	r, st
40	*F. kurilensis* (Pilsbry)	wb	0–5	r, st
41	*F. mundana* (Yokoyama)	lb	int	r
	Familia Onobidae			
42	*Onoba auriwilli axicostata* Golikov et Gulbin	lb	25–70	r, st, shi-she
43	*O. castanella* (Dall)	wb	30–70	r, st, shi-she
44	*O. compsa* Bartch in Golikov, Gulbin et Sirenko	lb	50–70	she
45	*O. tenuistriata* Golikov, Gulbin et Sirenko	lb	50–70	she
	Familia Rissoidae			
46	*Pussilina plicosa* (Smith)	lb	1–75	r, she, sa
	Familia Ansolidae			
47	*Ansola angustata* (Pilsbry)	str-lb	int–18	r, st, sa
	Familia Rissoellidae			
48	*Jeffreysina elatior* Golikov, Gulbin et Sirenko	lb	10–17	r
	Familia Caecidae			
49	*Brochina derjugini* Golikov in Golikov et Scarlato	lb	50–70	shi-she
	Ordo Canalifera			
	Familia Cymatiidae			
50	*Fusitriton oregonense* (Redfield)	wb	8–120	r, st, shi-she
	Ordo Echinospirida			
	Familia Trichotropidae			
51	*Turritropis insignis* Middendorff	wb	30–70	r, st, she
52	*Iphinoe kroyeri* Philippi*	b-a	110	sa
	Familia Capulidae			
53	*Capulus nobilis* (Adams)	wb	110–120	sa-she
	Familia Velutinidae			
54	*Limneria prolongata* (Carpenter)	wb	1–100	r, st-she
55	*Cilatovelutina nana* (Bartsch in Derjugin)	lb	7–115	r, st, she
56	*Velutina coriacea* Pallas	wb	7–15	r
57	*V. pulchella* Derjugin	lb	30–50	r

(continued)

	Species	Biogeographical group	Depth (m)	Substratum
58	*V. plicatilis* (Müller)	wb	30–60	r, st
59	*Marsenina uchidai* (Habe)	wb	7–80	r, si-sa-she, she
	Ordo Aspidofora Familia Naticidae			
60	*Pseudopolinices nanus* (Moeller)*	ab	24	sa-she
61	*Lunatia pallida* (Broderip et Sowerby)	b-a	5–159	sa-she
62	*L. pila* (Pilsbry)	lb	18–60	sa-she
63	*Bulbus normalis* (Middendorff)	wb	60	she
64	*B. tenuiculus* (Sowerby)*	lb	115	sa-she
65	*Cryptonatica aleutica* (Dall)	wb	40–60	sa
66	*C. hirasei* (Pilsbry)	lb	1–80	r, st, sa-she, shi
67	*C. janthostoma* (Deshayes)	wb	2–60	sa, si-sa, sa-she
68	*C. wakkanaiensis* Habe et Ito	lb	30–40	r, shi-she
69	*C. zenryumaruae* Habe et Ito	lb	18–72	st, sa-she
	Ordo Entomostoma Familia Cerithiopsidae			
70	*Cerithiopsis janira* Bartsch in Golikov et Scarlato	lb	40–100	r, st
71	*C. stejnegeri* Dall	wb	20	r
72	*Furukawaia fukuensis* Kuroda et Habe in Habe	str-lb	40–100	st, shi-she
73	*F. habei* Golikov et Gulbin	wb	115	sa-she
	Ordo Hamiglossa Familia Nassariidae			
74	*Triria fratercula* (Dunner)	str-lb	int–5	r, st
	Familia Buccinidae			
75	*Pseudoliomesus nassula* (Dall)	wb	180–220	si-sa, sa
76	*Lussivolutopsius filosus ochotensis* Kantor*	hb	100	she-st
77	*Aulacofusus nobilis* (Dall)	hb	100–150	she, st
78	*Plicifusus plicatus* (Adams)	lb	10–30	r
79	*Neptunea arthritica* (Bernardi)	lb	int–100	r, st
80	*N. bulbacea* (Bernardi)	lb	36–100	r, she-shi
81	*N. polycostata* Scarlato	lb	60	she-shi
82	*N. rugosa* Golikov	lb	60	shi
83	*Plicibuccinum plicatum* Golikov et Gulbin	lb	32	st
84	*Buccinum mirandum mirandum* Smith	wb	5–60	r, st, shi, sa
85	*B. ochotense timessa* Bartsch in Golikov	lb	2–70	r, st, sa-she
86	*B. percrassum* Dall	wb	2–7	r
87	*B. sakhalinense* Dall	lb	30–70	st, shi-she
88	*B. verkruzeni* Kobelt	lb	200–320	shi, si-sa-st
89	*B. pilosum* Golikov et Gulbin	wb	65–70	st-shi
90	*Volutharpa ampullacea* (Middendorff)	wb	65–70	st-shi
	Familia Anachidae			
91	*Mitrella burchardi* (Dunner)	lb	int–18	r, st
92	*Astyris amiantis* Dall	wb	30–70	r, st, she

(continued)

	Species	Biogeographical group	Depth (m)	Substratum
	Familia Muricidae			
93	*Boreotrophon candelabrum* (Adams et Reeve)	lb	5–80	r, st, she-shi
94	*B. dalli* (Kobelt)	lb	200	si-sa
95	*B. truncatus* (Stroem)	b-a	120–200	si-sa-shi
96	*Trophonopsis tegularis* Golikov et Gulbin	lb	7–100	r, st, she-shi
97	*Tritonalia japonica* (Dunker)*	str-lb	1–7	r, st
98	*Ceratostoma burnettii* (Adams et Reeve)	str-lb	0–14	r
	Familia Thaididae			
99	*Nucella heyseana* (Dunker)	lb	int–100	r, st
	Ordo Toxoglossa Familia Turridae			
100	*Antiplanes kurilensis* Kantor*	wb	115	she-sa
101	*A. sanduoannis* (Smith)	wb	32	st-shi
102	*A. vinosa* (Dall)	wb	100–115	st-she, sa-she
103	*Cranotoma albrechtii* (Krause)	hb	100–170	sa, st-she
104	*Obestoma solida*	b-a	220	si-sa
105	*O. simplex* (Middendorff)	b-a	195	si
106	*Oenopota impressa* (Beck in Moerch)	b-a	100	sa
107	*Oe. valentina* Bartsch in Golikov et Gulbin	wb	1	st
108	*Propebella nobilis* (Moeller)	b-a	195	si
109	*P. rassina*	hb	20–70	r, st, she
110	*Ophiodermella ogurana* Bartsch	lb	18–20	sa-she
	Ordo Heterostropha Familia Turbonillidae			
111	*Menestho exarata* (Adams)	lb	30	r
112	*Phasionema phycophyllum* Golikov et Kussakin in Golikov et Scarlato	lb	9–30	r, st
	Ordo Homoestropha Familia Eulimidae			
113	*Balcis kuronamako* Habe	str-lb	15–70	r, st-she

kawamurai, P. nobilis, P. raricostata, Haliotis discus, Margarites helicina, M. vahlii, Tristichotrochus consor, Minolia minima, M. picturata, Lacuna reflexa, L. uchidai, Epheria turrita, Littorina brevicula, L. sitkana, Falsicingula athera, F. kurilensis, L. mundana, Jeffreysina elatior, Velutina plicatilis, V. coriacea, V. pulchella, Cerithiopsis stejnegeri, Tritia fratercula, Plicifusus plicatus, Neptunea arthritica, Buccinum ochotense timessa, B. percrassum, Mitrella burchardi, Tritonalia japonica, Ceratostoma burnettii, Nucella heyseana, Phasionema phycophyllum, Menestho exarata, Balcis kuronamako. Many of these species occur in other areas also on other substrates, on mixed hard and even on silted grounds and cannot be considered as obligatory stenotopic. Their occurrence near Moneron Island exclusively on rocks, boulders and stones might depend on distinct predominance of these grounds in the upper shelf with hydrological conditions most favorable for the listed species.

On mixed hard facies with predominance of sand, stones, shingle and shells near Moneron Island, populations of 54 species occur: *Acmaea pallida, Cryptobranchia kuragiensis, Puncturella fastigiata, Scisurella crispata, S. disciformis, S. obtusata, Margarites pilsbryi, Minolia iridescens, Homalopoma amussitata, H. maculata, H. sangarense, Turritella fortilirata, Epheria decorata, Onoba auriwilli axicostata, O. castanella, O. compsa, O. tenuistriata, Pussilina plicosa, Ansola angustata, Brochina derjugini, Fusitriton oregonense, Turritropis insignis, Iphinoe kroyeri, Capulus nobilis, Limneria prolongata, Cilatovelutina nana, Bulbus normalis, Cryptonatica aleutica, C. hirasei, C. wakkanaiensis, C. zenryumaruae, Cerithiopsis janira. Furukawaia fukuensis, F. habei, Lussivolutopsius filosus ochotensis, Neptunea bulbacea, N. polycostata, N. rugosa, Plicibuccinum plicatum, Buccinum mirandum mirandum, B. sakhalinense, Volutharpa ampullacea, Astyris amiantis, Boreotrophon candelabrum, B. truncatus, Trophonopsis tegularis, Antiplanes kurilensis, A. sanduoannis, A. vinosa, Cranotoma albrechti, Propebella rassina, Oenopota valentina, O. impressa.*

Some species of the group (as it was also noted for the first group) can be found in other areas also on silted grounds, and occur near Moneron Island exclusivley on hard facies only because of the predominance of these facies.

On silted mixed grounds with stones and shingle, 8 species of gastropod molluscs occurred: *Lunatia pallida, L. pila, Pseudopolinices nanus, Bulbus tenuiculus, Cryptonatica janthostoma, Aulacofusus nobilis, Buccinum verkruzeni, Ophiodermella ogurana.*

Populations of 7 species, *Solariella delicata, S. obscura, Pseudoliomesus nassula, Boreotrophon dalli, Propebella nobilis, Obestoma solida* and *O. simplex* inhabit exclusively silted and sandy-silted facies on the shelf.

It is necessary to note that the last and the last but one groups are predominated by boreal-arctic and widespread species, which find favorable water temperatures on lower shelf, where silted grounds are common. The same grounds support some rare species, which seem to have a narrow range of distribution.

Vertical Distribution and Biogeographical Composition of the Fauna of Gastropod Molluscs

In the intertidal zone with tidal range of less than 1 m, few species occurred and only *Collisella cassis, Littorina brevicula* and *Falsicingula mundana* were specific for the zone (Fig. 1A).

Lack of specificity in distribution of molluscs over the intertidal zone may be connected with strong mixing and wave activity of coastal waters. This seems to explain also why 0–5 m depths are not distinguished here by specific populations as it is the case in other areas (Golikov & Scarlato, 1967; Golikov, 1980; etc.), but are regarded as a common adlittoral zone within the depth range of 0–10 m. Specific inhabitants of this zone at Moneron Island were: *Haliotis discus, Margarites helicina, Minolia minima, Lacuna reflexa, Buccinum percrassum,* and *Tritonalia japonica.* Similarity of the population of this zone with that of the intertidal zone (estimated as a percentage of the number of common species of the maximal variety of the sites under comparison) does not exceed 47%, but reaches 78% when compared with malacofauna

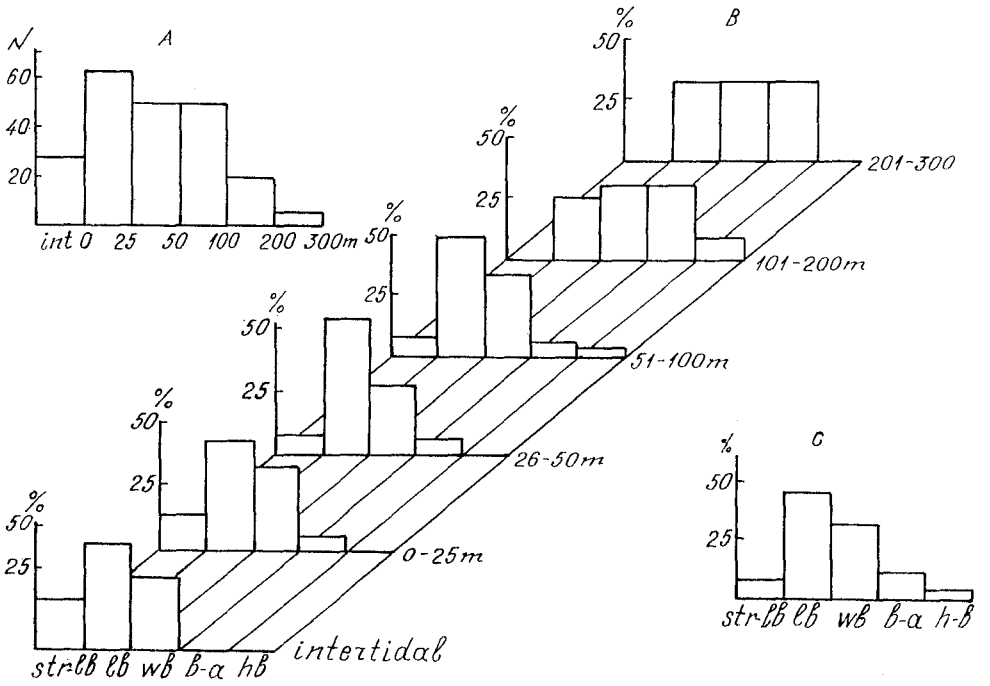

Fig. 1. Vertical distribution and biogeographical composition of the fauna of gastropods.
A: changes in the number of species (N).
B: biogeographical composition of the fauna of different depths (%).
C: total biogeographical composition of the fauna (%).
Abbreviations: str-lb: subtropical-low-boreal, lb: low-boreal, hb: high-boreal, wb: widespread boreal, b-a: boreal-arctic species.

of circumlittoral zone (10–25 m). For population of the last zone specific were: *Problacmaea moskalevi, Jeffreysina elatior, Velutina coriacea, Pseudopolinices nanus, Cerithiopsis stejnegeri, Plicifusus plicatus, Phasionema phycophyllum.* Fifty-six percent of the population of this zone is common with the population of the depth range of 0–10 m and 62% of species number with molluscan population of the sublittoral zone proper (25–50 m).

For the sublittoral zone *sensu stricta* (25–50 m), *Puncturella cucullata, Velutina plicatilis, Lunatia pila, Cryptonatica aleutica* and *Plicifusus plicatus* were specific. Population of this zone has only 44% species in common with the malacofauna of 10–25 m depths, but 80% of malacofauna is similar to that of the eulittoral zone (down to depth of 120 m). Here, specific were: *Brochina derjugini, Turritella fortilirata, Iphinoe kroyeri, Capulus nobilis, Furukawaia habei, Lussivolutopsius filosus ochotensis, Buccinum pilosum, Volutharpa ampullacea, Boreotrophon truncatus, Antiplanes kurilensis,* and *A. vinosa.* In spite of a considerable number of specific species, the similarity level of the population of the eulittoral zone (50–120 m) with that of the sublittoral zone *sensu lata* (0–50 m) in species composition of gastropod molluscs achieves 63%. Deeper than 120 m, the malacofauna sharply impoverished and changed considerably in species compo-

sition. For the outer shelf below 120 m specific were: *Solariella delicata, S. obscura, Aulacofusus nobilis, Pseudoliomesus nassula, Buccinum verkruzeni, Boreotrophon dalli, Obestoma solida, O. simplex*, and *Propebella nobilis.*

An analysis of vertical distribution of biogeographical groups of gastropod molluscs (Fig. 1B) shows that Pacific Asian low-boreal species predominate at all depths in species number. Their relative number strongly increases at depths of 25–70 m and rapidly diminishes below 100 m. The second in species number are Pacific widespread boreal species, relative number of which are maximal within the depth range of 0–25 m. At depths of less than 25 m, the third in species abundance are subtropical low-boreal species, the last of which disappear only at depths about 100 m. Boreal-arctic species appear at depths of about 5–7 m, and their relative number is rapidly increasing down to maximal depths studied. The Pacific high-boreal species inhabit depths greater than 55 m; their relative number strongly increases down to 200 m.

The material examined has shown that extension of vertical zones established with respect to the malacofauna of the Moneron Island. This can be connected with strong turbulent mixing of waters, influence of water circulations of the Tsushima current and frontal position of the island shelf with respect to the water currents flowing southwards, northwards and —in lesser extent— westwards. Really, population of the intertidal zone of the Moneron Island is of low specificity. The horizon of 0–5 m in species composition does not distinguish much. It seems that the horizon of 0–10 m should not be distinguished here as a separate adlittoral zone, although it has some specific traits in the species composition of the gastropod mollusc fauna, but does not distinguish significantly from deeper water layers. The depths about 25 m seem to be the real border of surface waters which represent in the locality the Tsushima water mass, and the malacofauna of shallower waters differs considerably in their composition from that from deeper waters. Moreover, at depth of 25 m, the number of subtropical-low-boreal species becomes equal to the number of boreal-arctic. Special horizons are depth ranges of 25–50 and 50–100 m, united in the zone washed apparently by an intermediate water mass from the Tatar Strait. A characteristic trait of this zone at Moneron island is an invasion of the area by subtropical species, which is not the case beyond the range and may depend on partial periodic submergence of Tsushima waters. Waters deeper than 100–120 m, which may derive from the Pacific water mass arising upwards the continental slope, sharply differ in species composition of the malacofauna. A sharp increase in the number of Pacific high-boreal species characteristic of the northern Pacific may be an indirect indication of this supposition.

As we can see on the Moneron Island shelf, low-boreal species (Fig. 1) have the greatest variety through the entire water column, which suggests that it is correct to refer it to the North-Japan (Japan-Sea, Ainian, Manchurian) low-boreal subregion of the Pacific boreal region, to which, when we take into account distribution of other groups of organisms (Forbes, 1856; Gurjanova, 1955; Kobyakova, 1956; Golikov, 1963, 1980; Tzvetkova, 1975; Kussakin, 1979 etc.), the entire shelf of the Tatar

Strait zone and the upper shelf of Aniva Bay and the eastern Sakhalin northwards to Terpeniya Bay (inclusive) belong. A relative number of subtropical species on the Moneron Island shelf (10%) is greater than in the adjacent area of the southern Sakhalin (8%), and near the Kurile Islands (4–6%), but lower than in Peter the Great Bay (up to 29%). This is explained by periodic impacts of circulating and pulsating branches of Tsushima current which brings larvae of warm-water species from stationary populations in shore waters of Japan to Moneron Island shores. Some species find in the upper shelf of the island favorable conditions for their survival and growth but not for reproduction, and the dynamics of their number depends here wholly on the number of introduced larvae. As it was noted earlier by Sirenko and Kasyanov (1976), *Haliotis discus*, a unique inhabitant of the upper shelf of the Moneron Island, undergos here severe annual variations in the number, mostly in younger age groups, which depends on the presence and intensity of circulating waters of the Tsushima Strait.

A relative number of the Pacific Asian low-boreal species is somewhat greater than in other areas of the north-Japan subregion and reaches 45%, while near the southern Sakhalin it makes 43%, decreasing to 25–30% in Terpeniya Bay, 30–40% at the Kuriles, and 44% in Peter the Great Bay. Most probably, this relative diversity of low-boreal species on the Moneron shelf also depends on transport by Tsushima current from Japanese shores of warm-water species originating from Sakhalin waters.

A share of the Pacific high-boreal species in the malacofauna of the shelf of Moneron Island did not exceed 3%, which is on the average 4 times less than on the shelf of the southern Sakhalin washed by cooler waters (12%) and 5 to 8 times less than near the Kuriles. Pacific widespread boreal species, which make 32% of the gastropod fauna near the Moneron Island shores, and on the average, along the southern shores of Sakhalin, 78% near the Kuriles and 21% in Peter the Great Bay of the Sea of Japan, differ significantly less.

Relatively cold-water boreal-arctic species are represented on the shelf of the Moneron Island and in Peter the Great Bay by nearly equal minimal numbers (6–10%), while on the shelf of the southern Sakhalin they are responsible for about 20%, and near the Kuriles for 16% of the gastropod fauna.

These observations show a certain peculiarity of the biogeographical structure of the fauna of gastropod molluscs of the Moneron Island shelf. This evidence is confirmed also by comparison of the degree of similarity of the fauna of gastropod molluscs of different sites of the North-Japan low-boreal subregion (Table 1).

As it is seen from the table, the fauna of gastropod molluscs of the Moneron Island shelf significantly differs from that of the Tatar Starit, Aniva Bay and Terpeniya Bay, and is most close to that of the Tatar Strait and sharply differs from the malacofauna of Terpeniya Bay. It is characteristic that the fauna of gastropod molluscs of the Tatar Strait does not differ significantly from that of Aniva Bay and differs considerably less from the malacofauna of the Terpeniya Bay.

The fauna of gastropod molluscs of the shelf of the Kuriles and Peter the Great

Table 1. Degree of similarity of the faunas of shell gastropod molluscs of the Moneron Island shelf (D_1), Tatar Strait (D_2), Aniva Bay (D_3), Terpeniya Bay (D_4), the Kurile Islands (D_5), and Peter the Great Bay (D_6).

areas	D_1	D_2	D_3	D_4	D_5	D_6
D_1	**113**	46	42	27	73	45
D_2	29	**152**	61	45	70	50
D_3	24	60	**177**	60	67	46
D_4	13	40	51	**162**	60	28
D_5	26	26	27	25	**236**	54
D_6	24	29	28	16	23	**125**

Note: Figures typed bold indicate the number of gastropod species in different areas. The lower left part of the table includes the Index of Similarity $r=\frac{C\cdot 100\%}{D_x+D_y-C}$, where C is the total number of species common for the sites under comparison, D_x and D_y. The upper right part of the table presents the relation $\frac{C\cdot 100\%}{D_x}$ where D_x is the least number of species in sites under comparison.

Bay differs less from that of the Moneron Island shelf from that of Aniva and Terpeniya bays, while the fauna of the Moneron Island shelf has significantly smaller area and smaller number of species. It is typical that the scope of difference between the gastropod mollusc faunas of the entire shelf of the Kuriles is comparable and on the average is smaller than their difference from the gastropod fauna of Peter the Great Bay. This may suggest that the shelf of the southern Sakhalin and that of the southern Primorye belong to different biogeographical provinces of the North-Japan (Ainian, Manchurian) low-boreal subregion. Thus, the gastropod fauna of the Moneron Island shelf has specific traits and significantly differs from the molluscan fauna of other sites of the southern Sakhalin and the shelves of Moneron, southern Sakhalin and Kuriles are more closely related in terms of the gastropod molluscan fauna than to the shelf of Peter the Great Bay, and this fact allows us to regard the Moneron Island shelf as a separate biogeographical district.

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